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Houston Lighting & Power South Texas Project Electric Generating Station P. O. Box 289 Wadsworth, Texas 77483

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U.S. Nuclear Regulator Commission
Attention: Document Control Desk
Washington, DC 20555

South Texas Project
Unit 2
Docket Number. STN 50-499
Request for Relief from ASME Section Boiler and Pressure Vessel,
Code, Section XI Requirements
Relief Request RR-ENG-13

Pursuant to 10 CFR 50.55a(a)(g)(4) and (5)(iii), Houston Lighting & Power Company (HL&P) requests relief from IWA 5250 of Section XI of the ASME Boiler and Pressure Vessel Code (ASME XI) in order to defer permanent repair of a flaw in the Unit 2 Reactor Makeup Water Storage Tank. The flaw was detected during service. HL&P intends to perform a code repair of the flaw as soon as practical, but not later than the next scheduled outage of 30 days or more for Unit 2.

HL&P has evaluated the leakage from the Reactor Makeup Water Storage Tank and determined that the operability and functionality of the system have been maintained and that deferring code repair of the flaw will not affect the health and safety of the public.

HL&P has evaluated the condition of the Reactor Makeup Water Storage Tank utilizing the general guidance of Generic Letter 90-05. The attached evaluation provides the basis for this Relief Request.

If you have any questions, please contact Mr. H.R. Pate at 512-972-7787, or me at 512-572-8787.

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Project Manager on Behalf of the Participants in the South Texas Project

MISC-94\94-312.001

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Reference Code: ASME Boiler and Pressure Vessel Code, Section XI 1983 Edition
Through Summer 1983 Addenda

A. INTRODUCTION

A.1 Component for Which Exemption is Requested:

(a) Name and Identification Number: Reactor Makeup Water Storage Tank (RMWST) TPNS 3R272NTF201A.

(b) Description: The RMWST is a vertical stainless steel tank containing a polyvinyl chloride diaphragm. The diaphragm prevents absorption of air which would raise the dissolved oxygen content above the allowable for use as reactor makeup water. Section 9.2.7.2.1 of the STP UFSAR gives a more detailed description of the RMWST.

(c) Class: ASME Class 3

(d) Description of the Problem: A leak was discovered on the RMWST coming from a weep hole on the reinforcing pad at a 2" pump recirculation nozzle. The seepage has been quantified at four (4) drops per hour.

A.2 Code Requirement for Which Relief is Requested:

Relief from IWA-5250 of the ASME Code Section XI in order to defe ASME Code repairs of a through wall leak from a defect located behind the reinfor ing pad on the RMWST.

A.3 Basis for Relief from Code Requirements

The safety-related Reactor Makeup Water System (RMWS) provides an assured source of makeup water to the Spent Fuel Pool Cooling and Cleaning System and to the Component Cooling Water System surge tank. It also provides reactor grade water to the Chemical and Volume Control System, Boron Recycle System, and the Reactor Pressurizer Relief Tank for alternative cooling and for the Reactor Coolant Pump standpipes.

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The design bases for the RMWS are:

1. To provide a source of high-purity water meeting chemical specifications for makeup to Reactor Coolant System (RCS) during normal operation and to systems listed in 2 below:

2. To provide reactor-grade water from the RMWST to the following systems:

   a. The Boron Recycle System (BRS) evaporator for flushing after draining.

   b. The BRS evaporator reagent tank for mixing chemicals.

   c. The BRS condensate demineralizers for additional cleanup of makeup water as required.

   d. The Chemical and Volume Control System (CVCS) boron blending "tee" for boration of water to fill or makeup to the refueling water storage tank and to provide makeup to the RCS through the Volume Control Tank (VCT).

   e. The CVCS boric acid batching tank for mixing boric acid solutions.

   f. The Spent Fuel Pool Cooling and Cleanup System (SFPCCS) as an alternate makeup source.

   g. The Pressurizer Relief Tank (PRT) for alternate cooling, and the Reactor Coolant Pump (RCP) standpipes in the Reactor Containment Building (RCB).

   h. The Component Cooling Water System (CCWS) surge tank for alternate makeup.

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The RMWS is not required for the safe shutdown of the plant and is not included in a Limiting Condition for Operation (LCO) in South Texas Project's (STP) P' it Technical Specifications. However, the system is used daily in support of plant operations at power including filling the RCP standpipes in the RCB approximately every 8 hours and normal makeup to the RCS.

Without modifications and significant operator work arounds it is not possible to shut down the RMWS to drain and ASME Code repair the RMWST tank during power operations. Considering the low safety significance of the tank, the minor nature of the leakage, the low pressure driving the leak, and the substantial design margins available, relief is requested using the guidance of Generic Letter 90-05 to perform an ASME Code repair as soon as possible, but not later than the next scheduled outage of 30 days or more for Unit 2.

B. SCOPE, LIMITATIONS AND SPECIFIC CONSIDERATIONS

B.1 Scope

The scope consists of the nozzle to tank weld and the tank wall behind the reinforcing pad as shown in Figure 1. The tank wall and reinforcing pad are SA240 type 304 material. The pipe nozzle is SA312 type 304 stainless steel with E308 weld material. The 2" nozzle identified as 75A for the pump recirculation line 2"RM-2006 is located 1 foot 6 inches from the tank bottom on the 220 degree azimuth.

B.2 Limitations

A small amount of seepage has been observed from a 1/8" NPT weep hole in the reinforcing pad. It is suspected that the source of the leak is a small defect in the weld of the nozzle to tank wall. The leak was found during plant operations. The intent is to let the through wall defect leak temporarily, subject to monitoring and an evaluation of structural integrity and of the consequences of leakage. Direct observation and nondestructive examination of the through wall defect is not possible at this time due to the joint configuration and presence of a reinforcing pad. An ASME Code repair will be performed as soon as possible, but not later than the next scheduled outage of 30 days or more for Unit 2.

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B.3 Specific Considerations

The flaw is expected to be a small through wall pinhole in the weld of the nozzle to tank wall. The leak is currently four drops per hour, and therefore unlikely to cause flooding. However, for analytical purposes it may be noted that system interactions, i.e., consequences of flooding due to the unlikely catastrophic failure of the RMWST tank have been evaluated as described in the UFSAR Section 9.2.7.3. The RMWST tank is located in a compartment in the Mechanical Auxiliary Building (MAB) which is designed to contain the contents of the tank. If both Reactor Makeup Pumps are lost as a result of flooding the MAB, a seismic Category I makeup source would be available by connecting temporary hoses to the vent and drain valves located on the Low Head Safety Injection discharge piping so that refueling water could be delivered to the SFPCCS as described in the UFSAR section 9.1.3.3.2. Low level in the VCT initiates makeup from the RMCS. If the RMCS does not supply sufficient makeup to keep the VCT level from falling to a lower level, a low level alarm is actuated. Manual action may correct the situation or, if the level continues to decrease, a low-low level signal from the level channels causes the suction of the charging pumps to be transferred to the Refueling Water Storage Tank (RWST). Should a loss of the RWST or the RMWST tank occur, the STP can shut down the Unit to Residual Heat Removal (RHR) cut-in via the Boric Acid Tanks (BATs). STP has two BATs, each with a nominal capacity of 33,000 gallons. The minimum capacity is specified in the Technical Specifications. The estimated makeup water usage to take the reactor from hot standby to RHR cut-in conditions is 25,000 gallons. Therefore, the Technical Specification inventory of the BATs is sufficient to shut down the Unit to RHR conditions as described in UFSAR Section 9.3.4.1.

The seepage will be monitored weekly by visual inspection of the reinforcing pad weep hole until ASME Code repairs can be made. A threaded nipple and tubing may be added for leakage collection if necessary. The RMWST compartment in the MAB is monitored on a daily basis by plant operations. Any significant change in the rate of leakage will be followed by a reevaluation of structural integrity of the RMWST tank.

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The temporary non-Code repair consists of the following:

> Leave as is, until the next scheduled outage of 30 days or more for Unit 2, subject to the monitoring plan described above, and subject to meeting the criteria for structural integrity described below.

C. EVALUATION

C.1 Leak Detection

The leak was detected during service by observing seepage through a 1/8" NPT weep hole on the reinforcing pad. The leakage rate has been monitored at approximately four drops per hour.

C.2 Root Cause Determination and Flaw Characterization

The root cause of the through wall defect is yet to be definitively investigated. The leakage from the weep hole has a slight brown color. The water exiting the weep hole was tested for Sulfate Reducing Bacteria (SRB) and total bacteria which can cause Microbiological Influenced Corrosion (MIC). The result of both tests were negative. If sufficient seepage exists to collect an additional test sample, the sample will be analyzed for the presence of the microbiological organism Gallionella by an outside lab. This tank has a previous history of MIC damage prior to operation that was ASME Code repaired. Based on the previous tank history it is believed that the through wall defect is a preexisting pinhole caused by MIC at the nozzle to tank weld which may have been missed during construction phase repairs. The brown color may be due to corrosion related residue that may have accumulated behind the reinforcing pad and may now be leaching out with the leaking water.

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C.3 Flaw Evaluation

The RMWST is a vertical, austenitic stainless steel tank used for storage of demineralized reactor makeup water. The 2" pump recirculation nozzle is constructed of stainless steel pipe attached to the tank and reinforced with a stainless steel pad outside the tank. The nozzle is welded inside the tank with a full penetration weld and the reinforcing pad is welded to the nozzle and shell with a 1/4" fillet (Figure 1)

The structural integrity of the RMWST tank was evaluated assuming a pinhole of 1/4" diameter in the tank nozzle weld. This estimate is based on the low leakage rate, and historical information which indicates that the probable cause of leakage is a pinhole caused by MIC during construction. The tank had suffered damage due to MIC during the construction phase, which was ASME Code repaired prior to completion of the tank. It is postulated that a pinhole was missed during those repairs and it may have been initially blocked. After years of operation the pinhole may have come unblocked thus leaking. Observations of MIC damage during the construction phase indicated the flaws to be rounded pinholes, generally very small. Assuming a 1/4" pinhole for analytical purposes is conservative. The evaluation below considered all design loading conditions, including dead weight, pressure and seismic loads.

Review of pipe stress analysis calculation identified significant design margins on the pump recirculation nozzle loads based on the as-built configuration. A minimum margin of 67% exists on the nozzle loads for the sustained loadcase, 78% for the upset loadcase and 88% for the faulted loadcase. Based on the substantial margins, compliance with Code Section III stress limits will not be compromised with a postulated through wall pinhole, and catastrophic failure is not credible. From a structural integrity point of view the tank would meet ASME Codes Section III and Section XI even with the postulated defect.

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C.4 Augmented Inspection

It is not practical to perform volumetric examination of the location because of the joint configuration and presence of a reinforcing pad.

The exterior of the tank has been 100% visually inspected and no other leaks were found.

At the next Unit 2 Refueling Outage, the welds in the lower ring and floor of the tank will be inspected visually. Any questionable indications will be liquid penetrant tested. If the results of this inspection give cause for questions about the condition of the rest of the tank, arrangements will be made for additional inspection of the tank interior.

The leakage will be monitored weekly by visual inspection of the reinforcing pad weep hole until ASME Code repairs can be made. Any significant change in the rate of leakage will be followed by a reevaluation of structural integrity of the RMWST tank and increased monitoring.

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Figure #1 2" Pump Recirculation Nozzle